

CLAIMS

What is claimed is:

Claim 1. A mobile handset comprising:
at least one of a firmware component and a software component;
an update agent capable of updating the at least one of a firmware component and a software component employing an update process that comprises a plurality of transform passes; and
the update agent executing at least one of the plurality of transform passes in a fault-tolerant mode.

Claim 2. The mobile handset according to claim 1 wherein the update agent executes each of the plurality of transform passes in a fault-tolerant mode.

Claim 3. The mobile handset according to claim 1 wherein the update process comprises a pre-processing pass and an update pass.

Claim 4. The mobile handset according to claim 1 wherein the update agent is capable of determining a point of interruption of the update process, so as to restart the update process from the point of interruption on a subsequent invocation of the update process.

Claim 5. The mobile handset according to claim 4 wherein the update agent is capable of efficiently determining whether a previous invocation of the update process was interrupted during a pre-processing pass or during an update pass.

Claim 6. The mobile handset according to claim 1 wherein the update agent is capable of efficiently determining which of the plurality of transform passes was interrupted during a previous execution of the update process.

Claim 7. The mobile handset according to claim 1 wherein the mobile handset further comprises:

- a plurality of memory banks;
- a set of special signatures comprising at least one special signature corresponding to each of the plurality of transform passes;
- the at least one special signature being associated with the last of the memory banks that is updated in the corresponding transform pass;
- at least a subset of the plurality of memory banks being modified in each of the plurality of transform passes; and
- the update agent capable of determining which of the plurality of transform passes was interrupted during a previous execution of the update process.

Claim 8. The mobile handset according to claim 7 wherein the update agent determines the transform pass that was interrupted during a previous execution of an update process, and the specific one of the plurality of memory banks that was last to be successfully updated, in order to resume the update process.

Claim 9. The mobile handset according to claim 8 wherein the update agent compares, in a transform pass order, each special signature from the set of special signatures to a signature computed for the last bank to be updated in the corresponding transform pass, until a mismatch is detected, the mismatch indicating a point of interruption during a previous update attempt.

Claim 10. The mobile handset of claim 7 wherein the special signature comprises one of a cyclic redundancy check (CRC) value and an MD5 hash value.

Claim 11. A mobile handset comprising a plurality of memory banks containing at least one of a firmware and a plurality of software components, the mobile handset comprising:

- an update package comprising a difference information;

an update agent capable of updating at least a portion of the at least one of firmware and a plurality of software components, the update agent employing an update process that comprises a plurality of transform passes, each transform pass updating a subset of the plurality of memory banks in a predetermined bank order for that transform pass; and

a set of decision maker banks identified within the plurality of memory banks, one decision maker bank for each of the plurality of transform passes, the set of decision maker banks used to determine which of the plurality of transform passes was interrupted, in order that the update process may be subsequently reattempted beginning with the interrupted transform pass.

Claim 12. The mobile handset of claim 11 wherein the update package comprises information identifying the set of decision maker banks.

Claim 13. The mobile handset of claim 11 wherein the difference information comprises a set of executable instructions for converting a first version of the at least a portion of the at least one of firmware and a plurality of software components, to a second version of the at least a portion of the at least one of firmware and a plurality of software components.

Claim 14. The mobile handset of claim 11 wherein the update agent is capable of:

- i) computing a signature for a decision maker bank in the set of decision maker banks, beginning with the decision maker bank for the first transform pass in the transform pass order;
- ii) comparing the computed signature to a corresponding predetermined signature for that transform pass, the predetermined signature contained in the update package, to determine whether a match exists;
- iii) repeating (i) and (ii) for the next transform pass in the transform pass order, if a match exists; and

iv) identifying the current transform pass as a point of interruption, if a match does not exist.

Claim 15. The mobile handset of claim 14 wherein:
the update package comprises a predetermined checksum for each memory bank in the subset of the plurality of memory banks for the interrupted transform pass.

Claim 16. The mobile handset of claim 14 wherein the update agent is capable of:
initiating a recovery from the point of interruption in the transform pass order;
and
determining the first bank in the predetermined bank order for the interrupted transform pass for which a mismatch between a computed checksum and a predetermined checksum for a memory bank in the predetermined bank order for the interrupt transform pass occurs.

Claim 17. The mobile handset of claim 16 wherein the computed checksum and the predetermined checksum comprise a cyclic redundancy check (CRC) value.

Claim 18. The mobile handset of claim 16 wherein the computed checksum and the predetermined checksum comprise a MD5 hash value.

Claim 19. A method for recovering from interruption of a fault-tolerant process of updating a mobile handset comprising a plurality of memory banks from a first firmware version to a second firmware version, the update process comprising a plurality of transform passes and having a transform pass order, each of the plurality of transform passes performing a transform upon the plurality of memory banks in a memory bank order, the method comprising:

determining as a recovery transform pass, one of the plurality of transform passes interrupted during the update process;

determining as a recovery memory bank, one of the plurality of memory banks in the memory bank order for the interrupted transform pass during which update processing was interrupted; and

invoking the update process by performing an update of the recovery memory bank using the recovery transform pass.

Claim 20. The method according to claim 19 wherein determining a recovery transform comprises:

employing one of the plurality of memory banks as a decision maker bank for each of the plurality of transform passes, each of the decision maker banks identifying the last bank of the memory bank order for the corresponding one of the plurality of transform passes to be updated, the decision maker banks retrievable from an update package; and

determining an interrupted transform pass in the transform pass order, based upon the decision maker banks for the plurality of transform passes in the fault-tolerant update process.

Claim 21. The method according to claim 20 wherein determining an interrupted transform pass comprises:

i) computing a checksum of a decision maker bank, beginning with the first transform pass in transform pass order;

ii) comparing the computed checksum to a predetermined checksum retrieved from the update package to determine whether the computed checksum matches the predetermined checksum;

iii) repeating (i) and (ii) for the decision maker bank of each of the subsequent transform passes in the transform pass order, if the computed and the predetermined checksums for a decision maker bank match; and

iv) identifying as interrupted, a transform pass for which the computed and predetermined checksums for a decision maker bank do not match.

Claim 22. The method according to claim 21 wherein the computed checksum comprises one of a cyclic redundancy check (CRC) value and an MD5 hash value.

Claim 23. The method according to claim 20 wherein the update package comprises a set of executable instructions for converting a first firmware version to a second firmware version.

Claim 24. The method according to claim 19 wherein the method is employed during both an initial update attempt and during recovery from an interrupted update attempt.